



**Lutheran
Health Network**

June 18, 2015

U.S. Nuclear Regulatory Commission
Region III
Materials Licensing Branch
2443 Warrenville Road
Suite 210
Lisle, Illinois 60532

Re: Mail Control #586896
Additional Information

Dear Ms. Simmons:

The following is provided as additional information that you requested regarding our renewal application for Materials License 13-01535-01

PET SHIELDING CALCULATION

- Shielding calculations for our PET imaging and patient uptake room are attached.

Y-90 MICROSPHERE PROCEDURES

We commit to follow the manufacturer's and NRC procedures for:

- Calculation / documentation of the patient dose / dosage
- Preparation of the dosage for administration
- Performance of pre / post administration vial measurements
- Development of a semi-annual physical inventory of used vials and waste to include: Radionuclide, Physical Form, Unique ID, Total Activity and Location of Storage
- Patient Release in accordance with 10 CFR 35.75
- Medical Event reporting in accordance with 10 CFR 35.3045 (b-g)

If you require and additional information, please contact us.

Sincerely,

Diane Springer RN CNO

Executive Management

LUTHERAN HOSPITAL
7950 W. JEFFERSON BLVD., FT. WAYNE IN 46804

P: 260 435-7001 W: LutheranHealth.net

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MEDICAL PHYSICS CONSULTANTS, INC.

2309 Shelby • Ann Arbor, MI 48103
(734) 662-3197 • (734) 662-9224 FAX
www.medphyscon.com

November 9, 2002

Tom Earnest
Director, Radiology
Lutheran Hospital of Indiana
7950 West Jefferson Blvd.
Fort Wayne, IN 46804

Re: PET Center Shielding

Dear Tom:

I have attempted to evaluate the required shielding for your PET imaging center. Please be aware that the shielding issues that you have been accustomed to in the past (X-ray energy <80 keV with nominal shielding of 1/16 inch) will not in any way be sufficient for PET (γ -ray 511 keV). The distances noted below are approximations based on the 1/8" = 1' scale drawing and the minification caused by fax machines.

The following general assumptions were made for this evaluation:

15 mCi ^{18}F -FDG injected per patient
Elapsed occupancy time for Injection rooms = 0 minutes
Elapsed occupancy time for scanner suite = 45 min
1040 patient exams per year (21/ week for a 50 week year)
Scanner distances were from mid-patient couch
Injection room distances were from mid chair and stretcher respectively
Injection room east and west walls will not require shielding due to limited occupancy factors for adjoining rooms.
Due to the use of fully shielded unit doses and anticipated hot lab tabletop shielding, exposures from the Hot Lab #108 are considered minimal.

SCANNER SUITE - #109

North Outside Wall

Occupancy factor of 0.0625 (Occasional)
Dose limiting criteria: 100 mrem/year
Distance: 250 cm (8.2')
Estimated Dose: 50 mrem/year

No Shielding Required

South Hallway Wall**Restricted Area**

Dose limiting criteria: 2 mrem in 1 hour

Distance: 200 cm (6.56')

Estimated Dose: 1.00 mrem/hr

No Shielding Required**West Outside Wall / Smoking Shelter**

Occupancy factor of 0.25 (Partial)

Dose limiting criteria: 100 mrem/year to general public

Distance: 350 cm (11.48')

Estimated Dose: 95 mrem/year

No Shielding Required**East Wall / Control Room - 110**

Occupancy factor of 1.0 (Full)

Dose limiting criteria: ALARA level I 500 mrem/year

Distance: 400 cm (13.12')

Estimated Dose: 280 mrem/year

No Shielding Required**WEST INJECTION ROOM - #105****South Wall to Room 10084 (Manager's Office)**

Occupancy factor of 1.0 (Full)

Dose limiting criteria: 100 mrem/year to general public

Distance: 200 cm (6.56')

Estimated Dose: 1360 mrem/year

SHIELDING REQUIRED**With the injection chair in the position noted it is impractical to shield this wall.****With the chair moved to the north (hallway) wall:**

Distance: 300 cm (9.84')

Estimated Dose: 690 mrem/year

SHIELDING REQUIRED

SHIELDING = 12.7 mm (1/2") lead

Estimated Dose: 110 mrem/yr

This estimate still exceeds the dose limit of 100 mrem/yr however the realistic occupancy of this office will be less than 100%. Approved national shielding standards do not accommodate occupancy factors of less than 1.0 for offices at this time.

Additionally simultaneous exposure to this office from both the West and East injection rooms was not considered as feasible or likely due to the timing associated with PET studies.

South Wall to Room 10083.8 (Secretary Office)

Occupancy factor of 1.0 (Occasional)

Dose limiting criteria: 100 mrem/year

Distance: 350 cm (11.48')

Estimated Dose: 496 mrem/year

SHIELDING REQUIRED

SHIELDING = 12.7 mm (1/2") lead

Estimated Dose: 79 mrem/yr

With the chair moved to the north (hallway) wall:

Distance: 500 cm (16.4')

Estimated Dose: 237 mrem/year

SHIELDING REQUIRED

SHIELDING = 12.7 mm (1/2") lead

Estimated Dose: 38 mrem/yr

North Wall to Hallway

Restricted Area

Dose limiting criteria: 2 mrem in 1 hour

Distance: 200 cm (6.56')

Estimated Dose: 1.31 mrem/hr

No Shielding Required

With the chair moved to the north (hallway) wall:

Distance: 80 cm (2.62')

Estimated Dose: 6.42 mrem/hr

SHIELDING REQUIRED

SHIELDING = 8.47 mm lead

Estimated Dose: 1.97 mrem/hr

EAST INJECTION ROOM - #104 and PATIENT TOILET - #103

North Wall to Hallway

Restricted Area

Dose limiting criteria: 2 mrem in 1 hour

Distance: 200 cm (6.56')

Estimated Dose: 1.31 mrem/hr

No Shielding Required**East Wall Stretcher to Receptionist Chair**

Occupancy Factor = 1

Dose Limiting Criteria = 100 mrem/yr

Distance: 350 cm (11.48')

Estimated Dose: 496 mrem/yr

SHIELDING REQUIRED

SHIELDING = 12.7 mm (1/2") lead

Estimated Dose: 79 mrem/yr

The following shielding estimate is made for insurance of the integrity of the imaging data acquired on the ADAC Forte Camera system and not for safety reasons. Please be aware that this is an estimate only, additional mobile shielding may be necessary to protect these highly sensitive detectors. Ideally shielding should be adequate to background levels but this is impractical.

South Wall Stretcher to ADAC Forte Detectors

Distance: 300 cm (9.84')

Estimated Dose: 1.02 mrem/hr

SHIELDING REQUIRED

SHIELDING = 12.7 mm (1/2") lead

Estimated Dose: 0.106 mrem/hr

It is our understanding that these estimates must be approved by a registered X-ray physicist recognized by the State of Indiana. Duane Zenn of our Indianapolis office, therefore should review and approve these plans when finalized.

References: Photon Shielding for a Positron Emission Tomography Suite: John C. Courtney, et.al. Health Physics Vol. 81, No. 2 August 2001

NCRP Report No. 49 Structural Shielding Design and Evaluation for Medical Use of X-rays and Gamma ray of Energies up to 10 MeV

If you require any additional information, please contact us.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas M. Kumpuris, M.S.", written in a cursive style.

Thomas M. Kumpuris, M.S., DABR
Medical Nuclear Physicist